Two charts for ESR panel discussion, with the data

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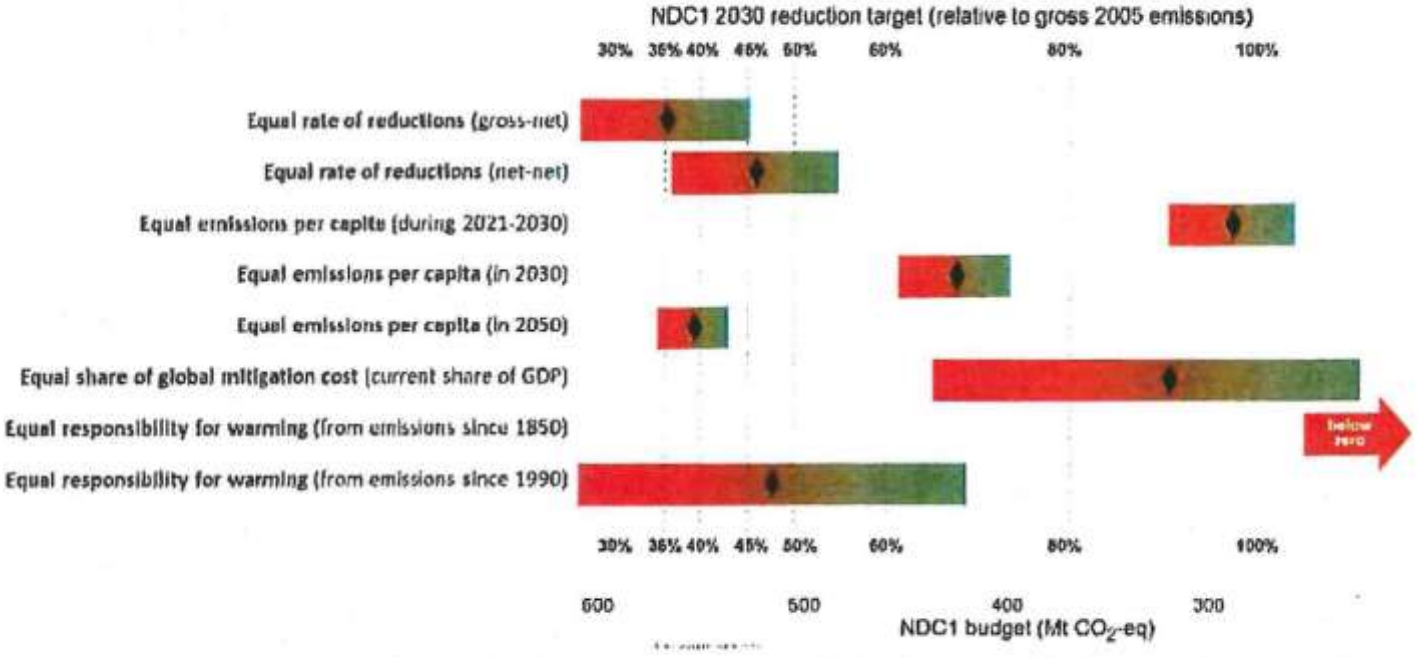
1. Degree of ambition relative to "fair share of the global burden"

This chart was in a Cabinet paper dated 10 June 2021 (https://environment.govt.nz/assets/publications/8-BRF-213-Consistency-of-NDC1-with-efforts-to-limitglobal-warming-to-1.5-degrees.pdf downloaded 9 June 2022 p.20 Figure 1):

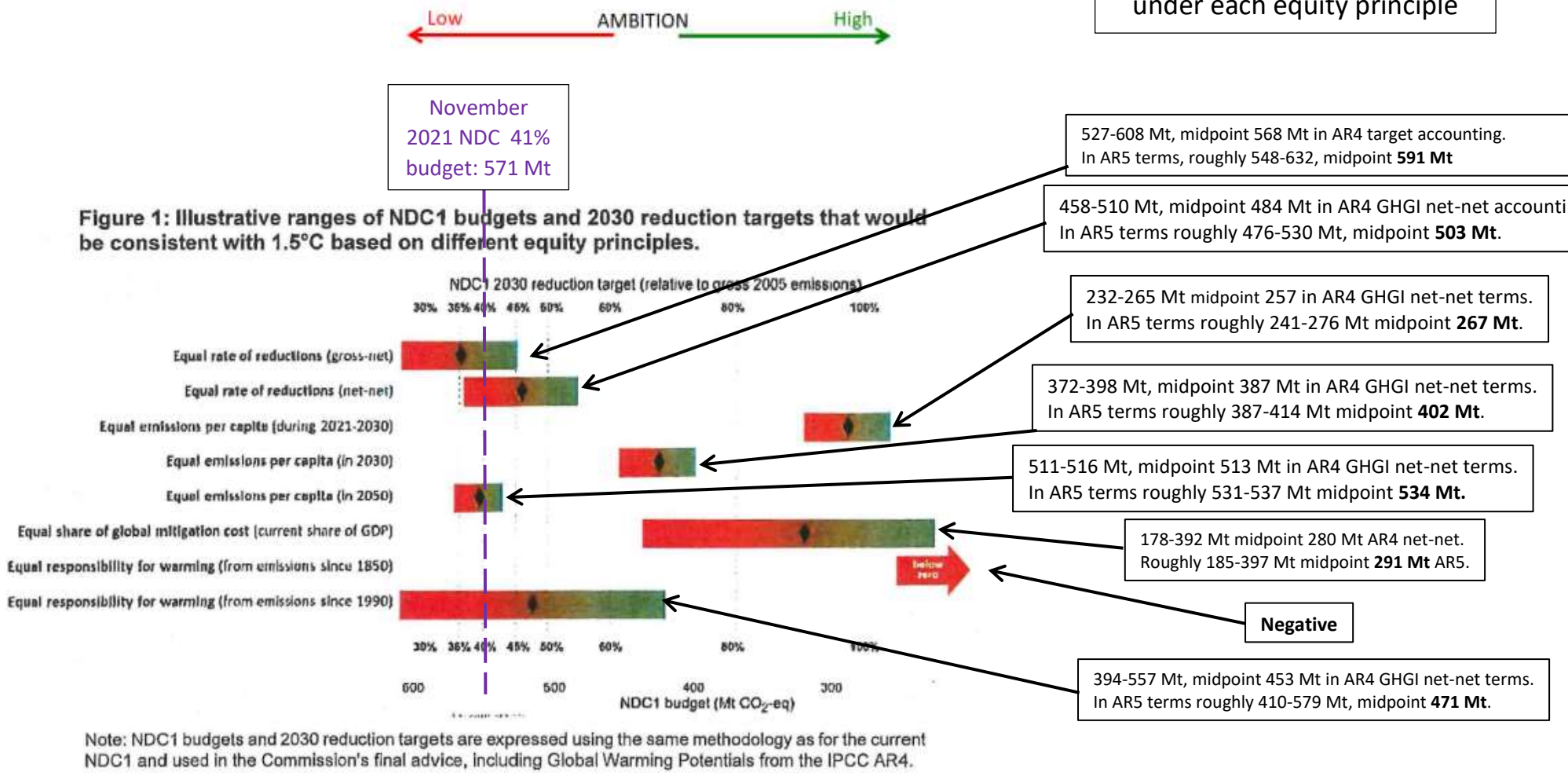
Figure 1: Illustrative ranges of NDC1 budgets and 2030 reduction targets that would be consistent with 1.5°C based on different equity principles.



Note: NDC1 budgets and 2030 reduction targets are expressed using the same methodology as for the current NDC1 and used in the Commission's final advice, including Global Warming Potentials from the IPCC AR4.

Here it is with my annotations:

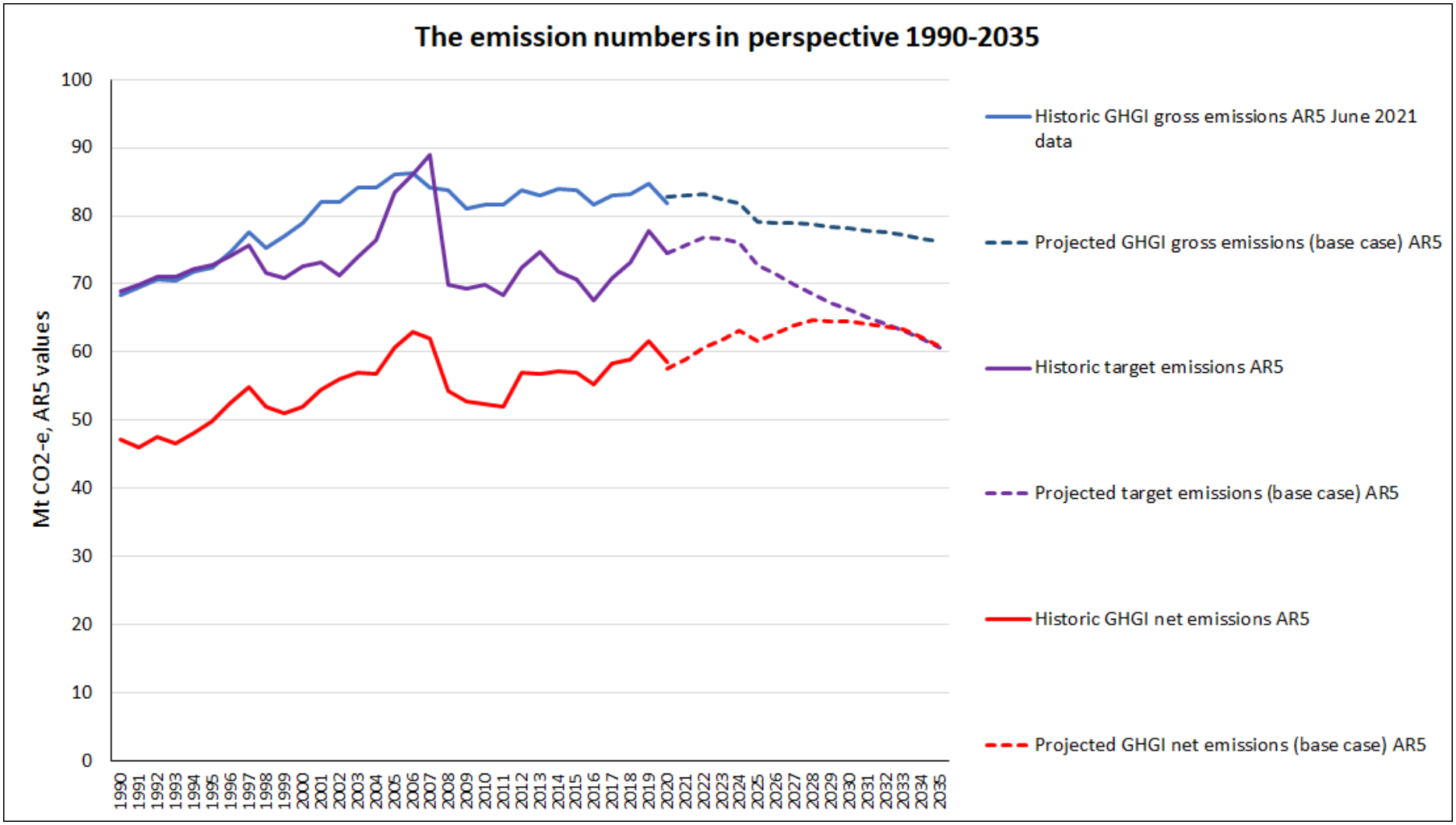
Estimated total target-accounted budget in AR4 and AR5 GWP100 terms 2021-2030 under each equity principle



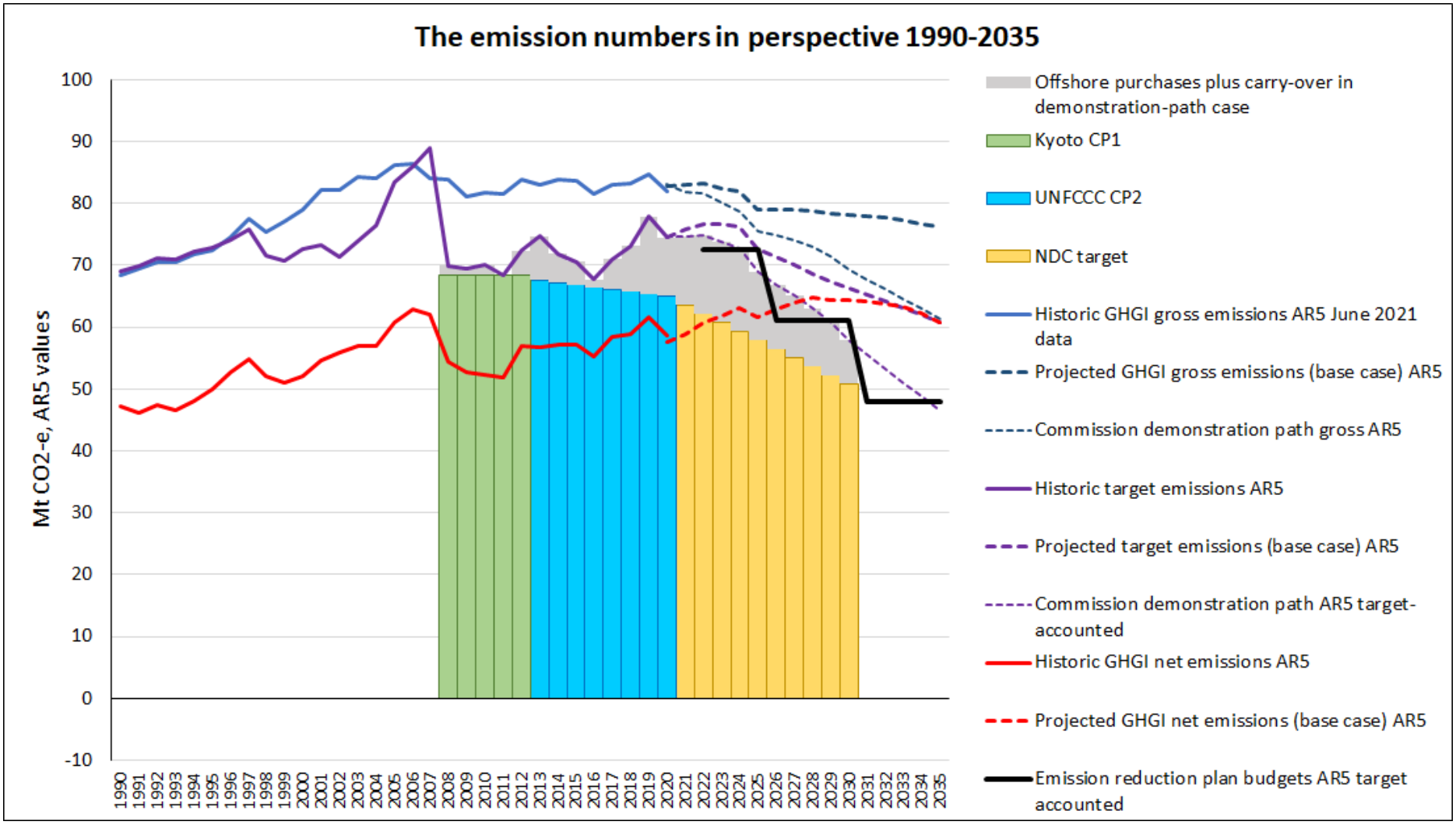
Note: the AR4 numbers are from pages 17-20 of the Cabinet paper, paragraphs 67, 72, 79 and 83, converted to target-accounting using paragraph 92 and then converted to AR5 values using AR4=>AR5 multipliers of unity for CO2, 1.12 for methane, 0.8892 for NO2, 0.947 for HFCs, 0.904 for PFCs, 1.03 for SF6.

2. History, projections and budgets

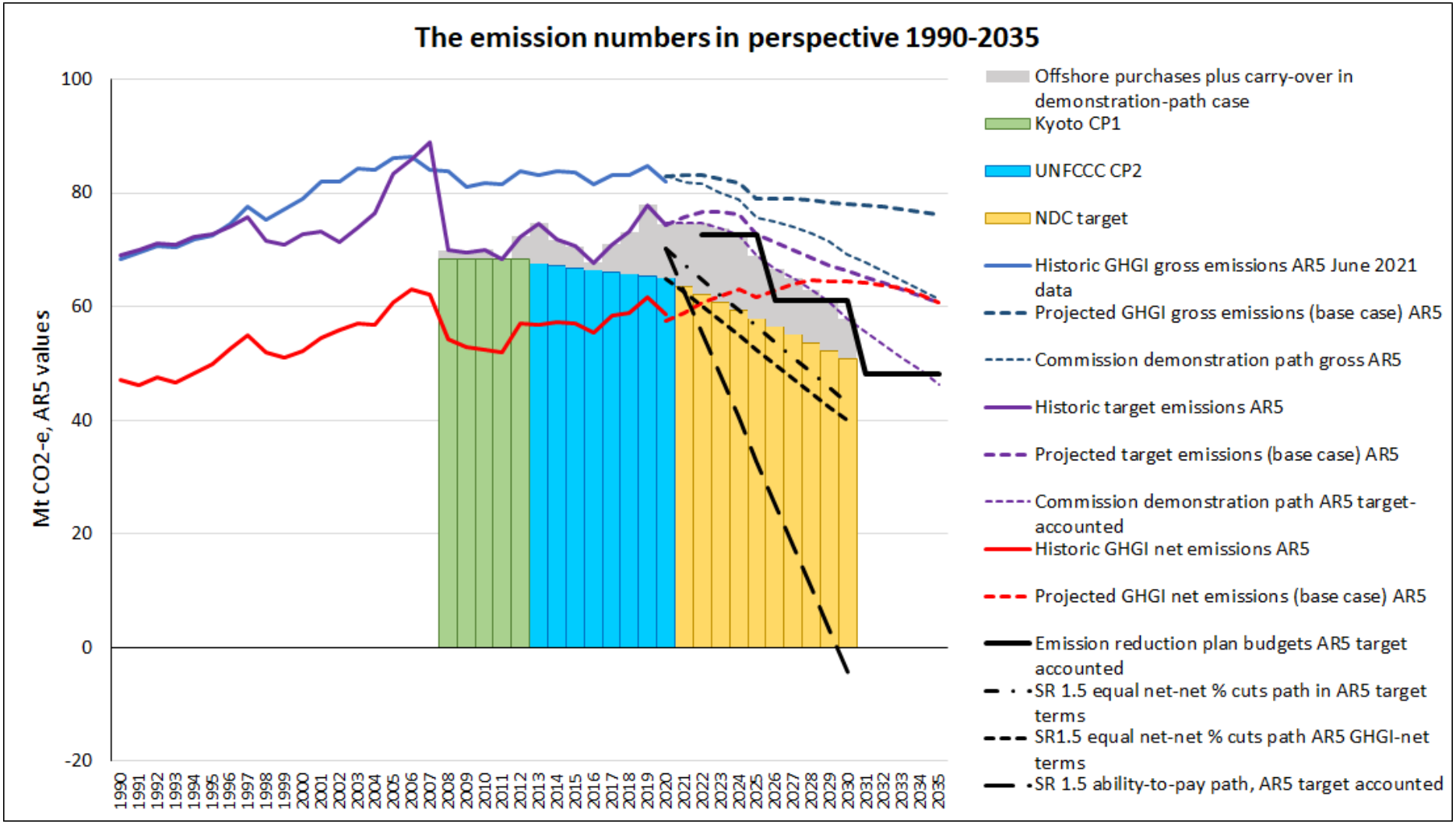
Here are the basic history and projections:



Add New Zealand Government commitments, targets and budgets:



Finally add two of those IPCC SR 1.5 scenarios from the first chart: equal % reductions on a GHGI net basis, and ability-to-pay:



Data for the chart

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Historic GHGI gross emissions, March 2022 MfE data, AR5 CO2-e	MfE projected GHGI gross emissions, base case, in AR5 CO2-e	Commission's projected GHGI gross emissions, demonstration path, in AR5 CO2-e	Historic GHGI net emissions, March 2022 MfE data, AR5 CO2-e	MfE projected GHGI net emissions, base case, AR5 CO2-e	Historic target-accounted emissions AR5 CO2-e	MfE projected target-accounted emissions AR5 CO2-e	Commission's projected target-accounted emissions, demonstration path, AR5 CO2-e	Kyoto CP1 commitment AR5 CO2-e	2013-2020 UNFCCC commitment	November 2021 NDC budget, AR5 CO2-e	Emission Reduction Plan budget 2022-2035, AR5 CO2-e	Offshore purchases and carried-over units AR5 CO2-e	SR 1.5 scenario 'equal % reductions net-net', AR5 CO2-e in GHGI net terms	SR 1.5 scenario 'equal % reductions net-net', AR5 CO2-e in target accounting terms	SR 1.5 scenario 'ability to pay', AR5 CO2-e in target accounting terms
1990	68,421			47,164		68,998										
1991	69,421			47,164		69,894										
1992	70,570			47,164		71,128										
1993	70,468			47,164		70,962										
1994	71,802			47,164		72,282										
1995	72,379			47,164		72,807										
1996	74,615			47,164		74,181										
1997	77,536			47,164		75,746										
1998	75,275			47,164		71,605										
1999	77,034			47,164		70,788										
2000	79,035			47,164		72,671										
2001	82,028			47,164		73,221										
2002	82,069			47,164		71,300										
2003	84,233			47,164		73,935										
2004	84,061			47,164		76,446										
2005	86,132			47,164		83,417										
2006	86,355			47,164		85,974										
2007	84,146			47,164		88,917										

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Historic GHGI gross emissions, March 2022 MfE data, AR5 CO2-e	MfE projected GHGI gross emissions, base case, in AR5 CO2-e	Commission's projected GHGI gross emissions, demonstration path, in AR5 CO2-e	Historic GHGI net emissions, March 2022 MfE data, AR5 CO2-e	MfE projected GHGI net emissions, base case, AR5 CO2-e	Historic target-accounted emissions AR5 CO2-e	MfE projected target-accounted emissions AR5 CO2-e	Commission's projected target-accounted emissions, demonstration path, AR5 CO2-e	Kyoto CP1 commitment AR5 CO2-e	2013-2020 UNFCCC commitment	November 2021 NDC budget, AR5 CO2-e	Emission Reduction Plan budget 2022-2035, AR5 CO2-e	Offshore purchases and carried-over units AR5 CO2-e	SR 1.5 scenario 'equal % reductions net-net', AR5 CO2-e in GHGI net terms	SR 1.5 scenario 'equal % reductions net-net', AR5 CO2-e in target accounting terms	SR 1.5 scenario 'ability to pay', AR5 CO2-e in target accounting terms
2008	83,738			47,164		69,901			68,336				1,565			
2009	81,094			47,164		69,391			68,336				1,055			
2010	81,700			47,164		69,975			68,336				1,639			
2011	81,558			47,164		68,371			68,336				35			
2012	83,770			47,164		72,342			68,336				4,006			
2013	83,084			47,164		74,627				67,700			6,927			
2014	83,898			47,164		71,763				67,303			4,461			
2015	83,675			47,164		70,590				66,906			3,684			
2016	81,558			47,164		67,670				66,508			1,161			
2017	83,031			47,164		70,949				66,111			4,838			
2018	83,207			47,164		73,108				65,714			7,394			
2019	84,741			47,164		77,811				65,317			12,494			
2020	81,868	82,775	83,102	47,164	57,483		74,425	74,705		64,919			9,506	64,924	70,068	70,068
2021		83,015	81,818		58,885		75,702	74,618			63,497		11,121	62,457	67,406	62,621
2022		83,128	81,601		60,658		76,731	74,789			62,074	72,500	14,656	59,901	64,647	55,175
2023		82,400	80,041		61,754		76,542	73,765			60,652	72,500	15,890	57,391	61,938	47,728
2024		81,828	78,736		63,086		76,116	72,615			59,229	72,500	16,886	54,878	59,226	40,281
2025		79,053	75,554		61,549		72,697	68,936			57,807	72,500	14,890	52,368	56,517	32,834
2026		78,933	74,856		62,852		71,385	66,712			56,384	61,000	15,001	49,856	53,806	25,387
2027		78,904	74,035		63,892		69,986	65,021			54,962	61,000	15,024	47,344	51,095	17,940

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Historic GHGI gross emissions, March 2022 MfE data, AR5 CO2-e	MfE projected GHGI gross emissions, base case, in AR5 CO2-e	Commission's projected GHGI gross emissions, demonstration path, in AR5 CO2-e	Historic GHGI net emissions, March 2022 MfE data, AR5 CO2-e	MfE projected GHGI net emissions, base case, AR5 CO2-e	Historic target-accounted emissions AR5 CO2-e	MfE projected target-accounted emissions AR5 CO2-e	Commission's projected target-accounted emissions, demonstration path, AR5 CO2-e	Kyoto CP1 commitment AR5 CO2-e	2013-2020 UNFCCC commitment	November 2021 NDC budget, AR5 CO2-e	Emission Reduction Plan budget 2022-2035, AR5 CO2-e	Offshore purchases and carried-over units AR5 CO2-e	SR 1.5 scenario 'equal % reductions net-net', AR5 CO2-e in GHGI net terms	SR 1.5 scenario 'equal % reductions net-net', AR5 CO2-e in target accounting terms	SR 1.5 scenario 'ability to pay', AR5 CO2-e in target accounting terms
2028		78,807	72,861		64,721		68,596	62,936			53,539	61,000	15,057	44,833	48,386	10,494
2029		78,374	71,514		64,428		67,287	60,807			52,117	61,000	15,171	42,321	45,674	3,047
2030		78,115	69,233		64,422		66,223	57,841			50,694	61,000	15,529	39,810	42,964	-4,400
2031		77,834	67,691		64,091		65,118	55,573				48,000				
2032		77,588	66,099		63,750		64,128	53,249				48,000				
2033		77,211	64,478		63,307		63,069	50,952				48,000				
2034		76,696	62,867		62,140		61,949	48,733				48,000				
2035		76,222	61,293		60,759		60,699	46,369				48,000				
2036		75,851	59,704		58,295		59,287	43,728								
2037		75,574	58,204		55,406		56,977	40,895								
2038		74,666	56,622		51,857		54,992	38,333								
2039		74,322	55,091		49,277		53,552	35,840								
2040		74,014	53,157		46,087		52,175	32,989								
2041		73,129	52,037		44,518		50,416	31,194								
2042		72,782	50,837		42,798		49,659	29,780								
2043		72,405	49,784		42,553		49,133	28,650								
2044		72,022	48,709		40,923		48,690	27,565								
2045		71,603	47,739		39,814		48,027	26,584								
2046		71,224	46,731		37,464		47,391	25,508								
2047		70,822	45,875		36,984		46,776	24,615								

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
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2048		70,381	45,126		36,385		46,101	23,883								
2049		69,911	44,332		36,776		45,388	23,174								
2050		69,417	43,542		37,804		44,651	22,536								

Sources:

Column (1) AR5 values calculated from the AR4 figures in New Zealand's 2022 GHGI submission in Excel file NZL_2022_2020_31032022_060046_review, extracted from zip file at https://environment.govt.nz/assets/publications/GhG-Inventory/Common-reporting-format-output-tables.zip downloaded April 2022, with CO2, CH4, N2O and SF6 converted to AR5 CO2-e using the multipliers drawn from *Global Warming Potential Values* at https://ghgprotocol.org/sites/default/files/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf downloaded 13 June 2022, and HFCs and PFCs converted from AR4 to AR5 values using multipliers calculated from comparing the worksheets 'NZ emissions AR4' and 'NZ emissions AR5' in the Commission's *NDC calculator for 2021 final advice* at https://ccc-production-media.s3.ap-southeast-2.amazonaws.com/public/Inaia-tonu-nei-a-low-emissions-future-for-Aotearoa/Modelling-files/NDC-calculator-for-2021-final-advice.xlsx downloaded August 2021.

Column (2) from MfE table prepared in June 2021 and published March 2022 https://environment.govt.nz/assets/2050-historical-and-projected-sectoral-emissions-data-March_2022-2.xlsx downloaded 10 June 2022, worksheet 'Projected base scenario AR5' row 15.

Column (3) from Climate Change Commission final report website https://www.climatecommission.govt.nz/our-work/advice-to-government-topic/inaia-tonu-nei-a-low-emissions-future-for-aotearoa/ , Modelling and Data/NDC calculations, Excel file at https://ccc-production-media.s3.ap-southeast-2.amazonaws.com/public/Inaia-tonu-nei-a-low-emissions-future-for-Aotearoa/Modelling-files/NDC-calculator-for-2021-final-advice.xlsx , worksheet

'Demonstration path' rows 19 (methane) and 28 (long-lived gases), AR4 values converted to AR5 using a multiplier of 1.12 for methane and 0.98 for long-lived gases (the latter ratio obtained by dividing the Commission's historical AR5 series in sheet 'NZ emissions AR5' by the matching series in the worksheet 'NZ emissions AR4'.

Column (4) AR5 values calculated from the AR4 figures in New Zealand's 2022 GHGI submission in Excel file NZL_2022_2020_31032022_060046_review, extracted from zip file at https://environment.govt.nz/assets/publications/GhG-Inventory/Common-reporting-format-output-tables.zip downloaded April 2022, with CO2, CH4, N2O and SF6 converted to AR5 CO2-e using the multipliers drawn from *Global Warming Potential Values* at https://ghgprotocol.org/sites/default/files/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf downloaded 13 June 2022, and HFCs and PFCs converted from AR4 to AR5 values using multipliers calculated from comparing the worksheets 'NZ emissions AR4' and 'NZ emissions AR5' in the Commission's *NDC calculator for 2021 final advice* at https://ccc-production-media.s3.ap-southeast-2.amazonaws.com/public/Inaia-tonu-nei-a-low-emissions-future-for-Aotearoa/Modelling-files/NDC-calculator-for-2021-final-advice.xlsx downloaded August 2021.

Column (5) from MfE table prepared in June 2021 and published March 2022 https://environment.govt.nz/assets/2050-historical-and-projected-sectoral-emissions-data-March_2022-2.xlsx downloaded 10 June 2022, worksheet 'Projected base scenario AR5' row 16.

Column (6) from MfE table prepared in June 2021 and published March 2022 https://environment.govt.nz/assets/2050-historical-and-projected-sectoral-emissions-data-March_2022-2.xlsx downloaded 10 June 2022 Sheet 'Estimated historical AR5' row 18.

Column (7) from MfE table prepared in June 2021 and published March 2022 https://environment.govt.nz/assets/2050-historical-and-projected-sectoral-emissions-data-March_2022-2.xlsx downloaded 10 June 2022, worksheet 'Projected base scenario' row 18.

Column (8) from Climate Change Commission final report website https://www.climatecommission.govt.nz/our-work/advice-to-government-topic/inaia-tonu-nei-a-low-emissions-future-for-aotearoa/ , Modelling and Data/NDC calcuations, Excel file at https://ccc-production-media.s3.ap-southeast-2.amazonaws.com/public/Inaia-tonu-nei-a-low-emissions-future-for-Aotearoa/Modelling-files/NDC-calculator-for-2021-final-advice.xlsx , worksheet 'Demonstration path' rows 18 (methane) and 27 (long-lived gases), AR4 values converted to AR5 using a multiplier of 1.12 for methane and 0.98 for long-lived gases (the latter ratio obtained by dividing the Commission's historical AR5 series in sheet 'NZ emissions AR5' by the matching series in the worksheet 'NZ emissions AR4'.

Column (9) set equal to the 1990 gross emissions in Column (1).

Column (10) calculated from the MfE April 2022 update in New Zealand's net position at https://environment.govt.nz/what-government-is-doing/areas-of-work/climate-change/emissions-reduction-targets/latest-update-on-new-zealands-2020-net-position/ accessed 10 June 2022. This gives a total budget of 509.8 Mt which has been multiplied by 1.04 to get an AR5 estimate. The total has then be allocated as a linear series adding to this total, with a 2020 terminal value equal to 95% of the 1990 gross emissions in Column (1).

Column (11) calculated to yield a total of 571 Mt over the ten years 2021-2030,with a 2030 value equal to 59% of gross emissions in 2005 from Column (1), reflecting a 41% reduction on 2005 gross emissions. The figures of 571Mt (in AR5 terms)(and a 41% reduction are taken from *New Zealand Submission under the Paris Agreement New Zealand's first Nationally Determined Contribution Updated 4 November 2021* https://unfccc.int/sites/default/files/NDC/2022-06/New%20Zealand%20NDC%20November%202021.pdf Appendix 1 p.1.

Column (12) from *Te hau mārehi ki anamata: towards a productive, inclusive and sustainable economy – Aotearoa New Zealand's first emissions reduction plan* https://environment.govt.nz/assets/publications/Aotearoa-New-Zealands-first-emissions-reduction-plan.pdf downloaded May 2022. p.31 Table 1.1.

Column (13) calculated from Columns (6), (7), (8), (10) and (11) by subtracting the budget for each year from the historic or projected target-accounted emissions. For the NDC period 2021-2035 the gap calculated is between the Commission's demonstration path and the budget.

Column (14) corresponds to the AR4 budget of 484 Mt 2021-2030 in the Cabinet paper *Consistency of NDC1 with efforts to limit global warming to 1.5°C* at https://environment.govt.nz/assets/publications/8-BRF-213-Consistency-of-NDC1-with-efforts-to-limitglobal-warming-to-1.5-degrees.pdf downloaded 9 June 2022 , p.19 paragraph 83(b), marked up gas by gas to an AR5 total of 511 Mt and allocated as a straight-line series with a 2030 value 41% below 2005 gross emissions from Column (1).

Column (15) is the GHGI net series in Column (14) marked up by 40.5 Mt in each year (the mid-point of the markup stated in the Cabinet paper *Consistency of NDC1 with efforts to limit global warming to 1.5°C* at https://environment.govt.nz/assets/publications/8-BRF-213-Consistency-of-NDC1-with-efforts-to-limitglobal-warming-to-1.5-degrees.pdf downloaded 9 June 2022 p.20 paragraph 92 (using the AR4 markup range stated there as near enough).

Column (16) allocates a total 2021-2030 budget of 280 Mt in AR4 terms as per the Cabinet paper *Consistency of NDC1 with efforts to limit global warming to 1.5°C* at https://environment.govt.nz/assets/publications/8-BRF-213-Consistency-of-NDC1-with-efforts-to-limitglobal-warming-to-1.5-degrees.pdf downloaded 9 June 2022 p.18 paragraph 7, marked up to an AR5 estimate of 291 Mt, with starting point at 70Mt to match the target-accounted 'equal % cuts' scenario in Column (15). (This is the starting point used in the Commission's Tables 13.4 and 13.5 in Chapter 13 of Supporting Evidence at https://ccc-production-media.s3.ap-southeast-.amazonaws.com/public/Evidence-21/Parts/Part-3-summary.pdf , marked up to AR5 terms.)